

FIGURE 423-2 Acute left hemiparesis due to right middle cerebral artery occlusion. **A.** Axial noncontrast computed tomography (CT) scan demonstrates high density within the right middle cerebral artery (*arrow*) associated with subtle low density involving the right putamen (*arrowheads*). **B.** Mean transit time CT perfusion parametric map indicating prolonged mean transit time involving the right middle cerebral territory (*arrows*). **C.** Cerebral blood volume (CBV) map shows reduced CBV involving an area within the defect shown in **B**, indicating a high likelihood of infarction (*arrows*). **D.** Axial maximum-intensity projection from a CT angiography (CTA) study through the circle of Willis demonstrates an abrupt occlusion of the proximal right middle cerebral artery (*arrow*). **E.** Sagittal reformation through the right internal carotid artery demonstrates a low-density lipid-laden plaque (*arrowheads*) narrowing the lumen (*black arrow*). **F.** Three-dimensional surface-rendered CTA image demonstrates calcification and narrowing of the right internal carotid artery (*arrow*), consistent with atherosclerotic disease. **G.** Coronal maximum-intensity projection from magnetic resonance angiography shows right middle cerebral artery (MCA) occlusion (*arrow*). **H.** and **I.** Axial diffusion-weighted image (**H**) and apparent diffusion-coefficient image (**I**) document the presence of a right middle cerebral artery infarction.

IV iodinated contrast is used to identify vascular structures and to detect defects in the blood-brain barrier (BBB) that are caused by tumors, infarcts, and infections. In the normal CNS, only vessels and structures lacking a BBB (e.g., the pituitary gland, choroid plexus, and dura) enhance after contrast administration. While helpful in characterizing mass lesions as well as essential for the acquisition of CTA studies, the decision to use contrast material should always be considered carefully as it carries a small risk of allergic reaction and adds additional expense.

■ INDICATIONS

CT is the primary study of choice in the evaluation of an acute change in mental status, focal neurologic findings, acute trauma to the brain and spine, suspected subarachnoid hemorrhage, and conductive hearing loss ([Table 423-1](#)). CT often is complementary to MR in the evaluation of the skull base, orbit, and osseous structures of the spine. In the spine, CT is useful in evaluating patients with osseous spinal stenosis and spondylosis, but MRI is often preferred in those with neurologic deficits. CT is often acquired following intrathecal contrast injection to evaluate for spinal and intracranial